

Remarks.

The Examiner's comments and objections and the cited references have been carefully considered by the Applicant.

It is noted that the Examiner has established a *prima facie* case of obviousness against claims 11-20, based on the assumption that all the claim limitations are taught or suggested in the prior art references to Behrens in view of Rearwin and further in view of France '198 and further in view of Cook.

Such assertion is respectfully traversed for the following reasons.

1. At least the following features of main claims 11, 18 and 20, see related steps, are neither taught or suggested by any of the cited prior references:

- a) one second opening for injecting in and, respectively, aspirating protecting gas from the containment chamber;*
- b) a supporting and guide element for the piston that is arranged separate from the containment chamber;*
- c) cleaning and lubricating means arranged in order of operation on said supporting element; and*
- d) so as to provide cleaning and lubricating on the whole external surface of the piston ..."*

In this respect it is submitted that:

-in relation with feature a)

Behrens teaches one opening through which inert gas is only introduced "*to pressurize the chamber and the mold cavity to force the metal into the cavity under sufficient pressure to insure...*".

The inert gas is let out only with the "*ram in its full forward position and following a determinable time period to allow for solidification of at least the surface...mold interface ...the mold is open and.....ambient air will fill the mold "*

See column 3, lines 18-23 and 35-39.

Thus Behrens not only is silent on provision of one, combined inert gas injection/suction opening and step during the melt injection, but in fact teaches away from the aspiration (through a same opening) for aspirating inert gas from the containment chamber during a second phase of the melt injection as claimed by the applicant, because Behrens teaches that advantageously the injection should be carried out under gas pressure.

Rearwin teaches vacuum injection with an injection chamber 22 that is contained in a vacuum hood 68 that evacuates air from the chamber through a front runner 40 and creates the depression necessary for the suction of the molten metal from a crucible 102 (column 6, lines 4-12).

Cook also teaches injection from a chamber 20 that is filled by pouring from a tilt crucible 32, 38, all placed in a vacuum chamber 16. There is no conduit/opening provision for feeding melt or for injecting/aspirating gas (column 3, lines 25-27).

-in relation with feature b)

In Behrens the ram rod is guided in the end opening of the chamber 13 and the ram 11 is guided directly and only at the chamber's walls (see figure 1).

In Rearwin the ram 92 is guided in a supporting element 112 that **is closely attached to the injection chamber 22 and acts as a vacuum sealing element for such chamber (column 6, lines 56-58.**

In France '198 the ram is supported at the end wall aperture of the chamber which is also provided with a pressure greasing element 4-5.

Cook teaches an injection chamber 20 fitted into a wall of a vacuum chamber 20 and with the piston rod supported and protruding from the opposite wall of the vacuum chamber.

-in relation with feature c)

In Rearwin the supporting element 112 that acts as a vacuum sealing element comprises further a vacuum chamber 114 in which only a wiping element 162 is provided that wipes the ram.

In French '198 the end wall aperture of the injection chamber is provided with only a **pressure greasing element 4-5**.

It is submitted that none of the cited documents teaches a **combination of guiding/supporting element for the ram that comprises both a cleaning and a lubricating means that are arranged in order of operation** .

Moreover, provision of the wiping element 162 in a vacuum sealing chamber teaches away from, and is technically incompatible with the provision of the **pressure acting greasing element of French '198**.

-in relation with feature d)

In Rearwin the wiping element 162 of the vacuum chamber 114 is taught to wipe the ram, necessarily, only partially (see fig 3 for its limit rearward position) in the area that rubs on the seals 144 of the vacuum chamber 114 just to avoid unsealing of and leakage from the chamber 114 (see column 8, lines 16-25).

Accordingly the claimed invention cannot be deemed obvious over the cited prior art (In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974).

In view of the technical problem suggested by Rearwin to clean the sealing surface of the ram, or even in view of that suggested by the Examiner in the Official Action regarding the prolongation of the working life of the ram, the skilled person would never try to adopt special provisions for cleaning the whole surface of the ram since this problem and related incentive is not suggested in the cited prior art.

It ensues that there are **no objective incentives** to combine the cited prior art and indications on the non-obviousness of the claimed invention.

Moreover, clear and objective differences in, and incompatibilities between the pressure injection of Behrens and vacuum casting of Rearwin and Cook and French '198 render unsuitable, insufficient, unlikely or inconclusive the combinations of teachings available from such documents as pointed out in the Official Action.

It is also submitted, as set forth above, that the basic reference to Behrens, by its pressure injection, teaches away from the invention.

It will also be noted that there is a lack of suggestion in the cited prior art of the desirability of modifying the basic reference or combining the references, since none of the cited documents deals with the casting, particularly thin wall casting, of Al-Mg alloys and with the related problems set forth in the preamble of the applicant's specification.

This clearly shows a lack of motivation for the skilled person for the modification/combination suggested by the Examiner (In re Vaek, 947 F.2d 488, 20' USPQ2d 1438 (Fed. Cir. 1991; In re Linter, 458 F.2d 1013, 173 USPQ 560, 562 (CCPA 1972); Ex parte Clapp, 227 USPQ 972, 973 (Bd.Pat. App. & Inter. 1985); In re Jones, 958 F.2d 347, 21 USPQ 1941 Fed. Cir. 1992).

Last but not least, the modification of the basic reference Behrens and the combination thereof with the other cited prior documents, as suggested by the Examiner would change the principle of operation of the prior invention.

Thus the teachings of the cited references are not sufficient to render the claims pending in the application obvious (In re Ratti, 270 F.2d 810, 123 USPQ 349 (CCPA 1959)).

Since the other independent claims and the claims dependent thereon, pending in the application, contain or include at least the limitations or method steps corresponding thereto (see claim 20) listed above (see a-d above), the facts and conclusions of non-obviousness set forth apply to all of them too.

It is eventually submitted that all of the objective facts herein represented are concordant and are consistent with the true teachings of the prior art and with the conclusions set forth.

Accordingly, it is now believed that the application is an allowable condition and allowance thereof is respectfully solicited.

While it is believed that the amended claims properly and clearly define the present invention, applicant would be open to any suggestion or amendment the Examiner may have or propose

concerning different claim phraseology which, in the Examiner's opinion, more accurately defines the present invention.

Respectfully submitted,



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